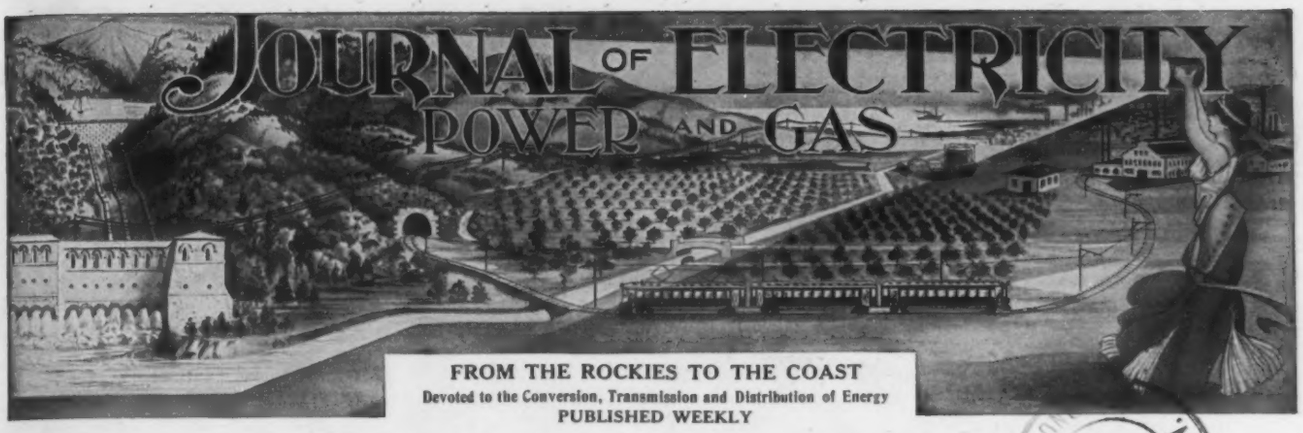
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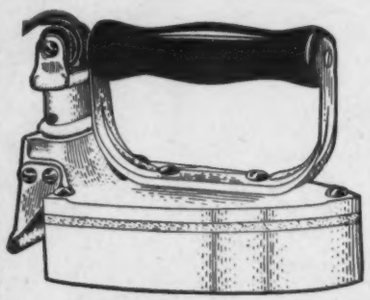

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Devoted to the Conversion, Transmission and Distribution of Energy.

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NORTHWEST ELECTRIC LIGHT AND POWER ASSOCIATION

The Northwest Electric Light and Power Association was organized at a meeting of seventy-five representatives of Northwest power companies held at Seattle, Wash., on September 19, 1908. The new association includes in its membership the electric light and power companies, their officers and employees, throughout Idaho, Montana, Oregon, Washington, and Alaska. The following officers were elected for the ensuing year:

To the executive committee was delegated power to elect a permanent secretary. J. D. Crary, of Aberdeen, Wash., is temporary secretary.

Members present at the meeting were: J. M. Kinkaid, Port Townsend; Morton Ramsdell, J. B. Lukes, E. E. Potter, B. M. Arms, S. C. Lindsay, A. L. Snyder, E. C. Gaumnitz, James B. Howe, and W. J. Grambs, Seattle; W. M. Hamilton, Portland; H. J. Mumford, Olympia; A. Welch, Portland; F. S.

Northwest Electric Light and Power Association

President, Arthur Gunn, of Wenatchee, Wash.; first vice-president, A. Welch, of Portland; second vice-president, Francis Rotch, of Fairbanks; third vice-president, Henry Adams, of Lewiston, Idaho.

Executive committee, three-year term—H. L. Bleecker, of Spokane; I. W. Anderson, of Walla Walla; and E. E. Potter, of Seattle.

Two-year term—L. B. Faulkner, of Olympia, and C. G. Arrowsmith, of North Yakima.

One-year term—O. B. Caldwell, of Portland, and M. J. Shields, of Moscow, Idaho.

Jacobson, Leavenworth; L. F. Query, Stanwood; S. A. Hoag, F. W. Bliss, and C. A. Carter, Seattle; Henry Adams, Lewiston; Isaac W. Anderson, Tacoma; F. W. Saxaner, Lynden; E. G. Robinson, Arlington; C. H. McNary, Clarkston, Idaho; Will H. Parry, Pasco and Seattle; J. B. Ingersoll, Spokane; M. J. Shields, Moscow, Idaho; A. E. Irons, Spokane; Leslie R. Coffin, Bellingham; Francis Rotch, Fairbanks; F. S. Drake, Walla Walla; Z. V. Greene, Monroe; W. H. Franklin, Mt. Vernon; J. D. Crary, Aberdeen; C. H. Cleaver, Granite Falls; W. I. Sturdevant, Everett; Codd McKenzie, Colfax; Douglass Almond, Anacortes.

METHODS FOR LOCATING TRANSPOSITIONS OF WIRES AND SPLIT PAIRS IN TELEPHONE AND TELEGRAPH CABLES.*

By Henry W. Fisher.

Some of the telegraph companies demand that there shall be no transpositions of wires in any of the layers in a telegraph cable. By this is meant that the wires of every layer must have the same relative order at each end of the cable. There is usually a tracer or wire covered with different colored paper from the rest in every layer, and by counting from this tracer any particular wire can be located at any point in the cable. If a wire is fifth from the tracer in a clockwise direction at one end of the cable, it will be fifth from the tracer in a counter clockwise direction at the other end of the cable. By this general plan it becomes possible to identify wires without resorting to some of the common methods of testing. However, in order to be able to place implicit reliance in a scheme of identification of this sort, not only must the cables be manufactured correctly, but the jointing must be made by skilled men who are careful to connect the wires of each layer in consecutive order, and as an extra precaution make repeated tests at both ends of the jointed sections as the work of splicing progresses. Even after exercising the greatest care, a transposition may occur. The object of the present article is to show how a fault of this kind can readily be located by some methods devised by the author.

To do this, a ballistic galvanometer, battery, condenser, and discharge key can be employed, but the writer prefers to use an alternating current or continually reversed direct current,

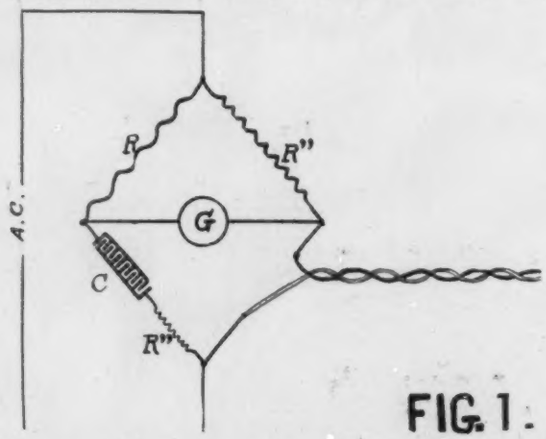


FIG. 1.

a wheatstone bridge or its equivalent, a condenser, and, as a current detector, a telephone, or, still better, a vibration galvanometer.

Instruments are now made which are suitable for this work, provided that the length of cable is great enough to obtain sufficiently discriminating values between the various tests made.

As the methods employed deal entirely with measurements of electrostatic capacity, which are ably described in many text and hand books, the writer will here only briefly show by diagram and description the arrangement of sensitive apparatus which was employed to verify the accuracy of the methods used.

Fig. 1 gives in diagrammatic form the connections and apparatus employed. R, R', and R'' are non-inductive resistances wound also so as to have a minimum capacity. G is the vibration galvanometer, C a standard condenser, and AC the alternating-current source, which, by means of an electrically driven tuning-fork arrangement, was kept at a frequency that gave maximum vibration to the galvanometer needle. The resistance R'' is needed to obtain the condition of balance or zero vibration of the galvanometer.

*A paper presented at a meeting of the Pittsburg Section of the American Institute of Electrical Engineers.

The plan of operation was to keep R' constant and vary R and R'' until the galvanometer ceased to vibrate. R'' does not enter into the calculation of capacity, which is represented by the formula $\frac{R}{R'}C$. Therefore, as R' and C were constant, the relative capacities are proportioned to R, and as we deal here entirely with relative values, the figures given for the different tests are the R resistances required to give zero vibration to the galvanometer.

Telegraph cables. Before proceeding to the derivation of formulas, it is important to remember that the theory of relative capacities with different connections in bunched or paired telegraph or telephone cables is extremely complex. The formulas here given are not absolutely correct, on account of certain very small capacity effects that are ignored for the sake of simplicity. They are probably close enough, however, because it is impossible to make cables of this sort and not have in the capacities of different wires variations of as much as five or ten per cent, which would be sufficient to cause great discrepancies, even if theoretically correct formulas were employed.

We shall first consider the simplest case, namely, that where adjacent wires in a telegraph cable are transposed, and after that we shall give general directions which are applicable to almost any condition of single transposition.

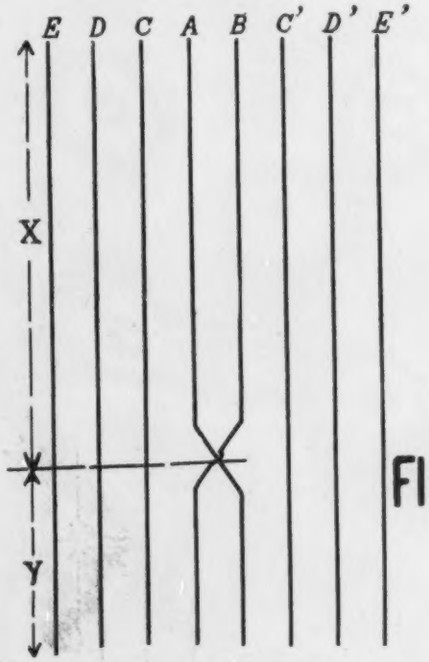


FIG. 2.

Fig. 2 represents a number of wires in a layer of cable. A and B are the two wires which are transposed at a distance of X feet from the end where the test is applied and Y feet from the other end of the cable. In representing a test between two wires, the letters designating each will be coupled together thus: The capacity between A and B will be spoken of as capacity AB.

The general plan of procedure is to determine the capacity between adjacent wires and also the capacity between wires C and E, the latter being selected so that the number of wires between C and E is equal to the number between C and B or between C' and A.

If the capacities between C and A and between C and B are then measured, we can derive a formula which will give the approximate distance to the fault. In order to get good average results, it is advisable to make a number of measurements of similarly placed wires, as is shown below. The first thing to do is to determine the relative capacity values of the following combination of wires: AB, CE, $C'E'$, CA, $C'B$, CB, $C'A$.

Let capacity $A\ B = a$ (1)

" " $\frac{C\ E + C'\ E'}{2} = b$ (2)

" " $\frac{C\ A + C'\ B}{2} = c$ (3)

" " $\frac{C\ B + C'\ A}{2} = d$ (4)

Let L = the total length of the cable.

The capacity per foot of (1) $= \frac{a}{L}$ (5)

The capacity per foot of (2) $= \frac{b}{L}$

From which we get:

$$\frac{a}{L}x + \frac{b}{L}y = c \quad (7)$$

$$\frac{a}{L}y + \frac{b}{L}x = d \quad (8)$$

Solving equations (7) and (8) for x, we have:

$$x = \text{the distance to the fault} = \frac{a\,c - b\,d}{(a-b)\,(a+b)} \times L \quad (9)$$

Now as $x+y=L$, we can substitute $y=L-x$ in equations (7) and (8) and get the following results:

$$x = \frac{c-b}{a-b} \times L \quad (10) \text{ from equation (7)}$$

$$x = \frac{a-d}{a-b} \times L \quad (11) \text{ from equation (8)}$$

Equation (9) is the proper one to use, because equations (10) and (11) do not generally give concordant distances, although their average is usually near the distance obtained by equation (9).

To give the above formula a practical test, two wires were transposed at 130 feet from the end of a cable measuring 280 feet, and the following values were obtained:

Transposition No. 1.

$$a = 167$$

$$b = \frac{132.5 + 133}{2} = 132.75$$

$$c = \frac{148 + 145.5}{2} = 146.75$$

$$d = \frac{147.5 + 150.5}{2} = 149$$

Substituting these values in equation (9), we get: $x = 128.9$ feet, or about 1 foot from the transposition. Substituting in equations (10) and (11), the values of x are 113.6 feet and 146.1 feet, or an average distance of 129.8 feet.

Transposition No. 2.

$$a = 161.5$$

$$b = \frac{127 + 130}{2} = 128.5$$

$$c = \frac{138.5 + 141.5}{2} = 140$$

$$d = \frac{140.5 + 142.5}{2} = 141.5$$

Substituting these values in equation (9) we get,

x = 129.6 ft., or about 0.5 ft. from the transposition.

Substituting in equations (10) and (11) the values of x are 96.9 ft. and 168.4 ft., or an average distance of 132.6 ft.

As mentioned before, it will be noted here that the values found by equations (10) and (11) differ widely. This may be partly due to inequalities in manufacture, but is more likely caused by the formulas being only approximate. The average value of (a) as measured should be slightly too high, and this would make the results by formula (11) too great. In formulas (10) and (11) nearly equal terms are subtracted and this is always a source of error. This kind of test is necessarily of such nature that even slight irregularities in manufacture may cause great differences in the calculated distances. It is for this reason that so many measurements have to be taken, for we are enabled thereby to obtain average results.

We will next consider the case where there are several wires between the transposed wires, which, as before, should be marked A and B. The wire adjacent to B should be marked C' and that next to A should be marked C, as indicated in Fig. 3.

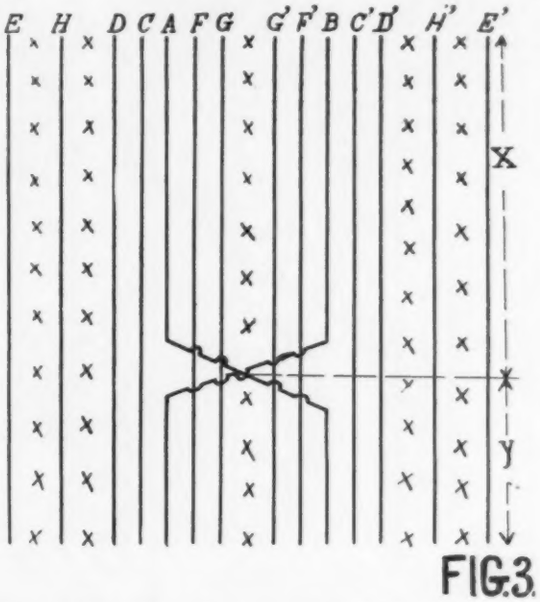


FIG. 3.

Then select and mark a wire E such that the number of wires between C and B is equal to that between C and E. Also select and mark a wire E' such that the number of wires between C' and A is equal to that between C' and E'.

The tests can now be made exactly as described above, with the exception that for capacity $AB = a$, the capacity between several pairs of adjacent wires near but not including A or B should be determined and the average of these taken as (a) in formula (9). The wires generally measured are CD, FG, $F'G'$, $C'D'$. After the values of (b), (c), and (d) are found, the distance to the fault can be calculated by equation (9), and if desired for the sake of comparison, by equations (10) and (11).

A separate set of values for b, c, and d can be found by selecting the wire H so that the number of wires between F and H equals the number between F and B; also the wire H' so that the number of wires between F' and H' equals the number between F' and A.

Then

$$b = \frac{F\,H + F'\,H'}{2} \quad c = \frac{F\,A' + F'\,B}{2} \quad \text{and} \quad d = \frac{F\,B + F'\,A}{2}$$

With these and the previously determined value of (a) a check value of x can be found by equation (9).

Fig. 4 illustrates the case of a single displaced wire A. Here the number of wires between C and E and between C'

and E' equals the number between C and a. Also the number of wires between F and H and between F' and H' equals the number between f and a. Having tagged the wires as just described and as illustrated in Fig. 4, the same connections and tests as mentioned above can be made except those involving the wire B, which does not exist here. Therefore only one-half the number of tests can be made to get c and d, and hence an accurate location of the fault cannot be expected.

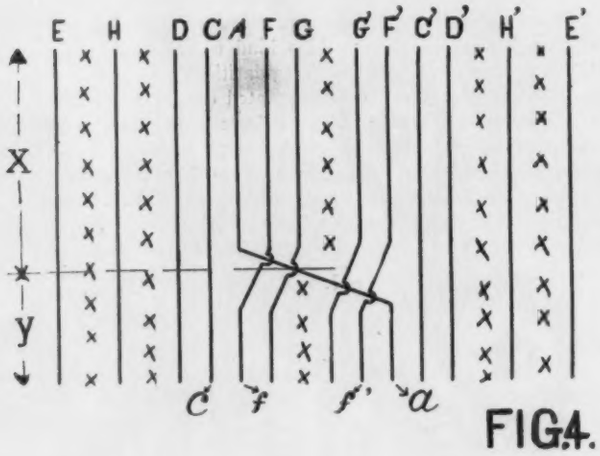


FIG. 4.

Tables 1 and 2 give the results of tests on telegraph cables.

Fault 1 had 3 wires between A and B.

Fault 2 had 2 wires between A and B.

Fault 3 had 3 wires between A and B.

Fault 4 had 2 wires between A and B.

Fault 5 was a single displaced wire as illustrated in Fig. 4, and there were 4 wires between a and c. All the figures obtained are given in the tables so that persons interested in this subject can study them, noting the change of capacity for different connections.

Table II gives the errors in feet; they are sometimes + errors and sometimes — errors, thus tending to show that inequalities in manufacture are probably largely the cause of the discrepancies.

Telephone cables. Telephone cables are made up of twisted pairs, and when they are jointed no attempt is made to connect the pairs in any definite order. In fact, most of the telephone companies mix the pairs of the different layers up as much as possible, thereby making the capacity of the pairs more uniform and the cable more efficient for telephone service. On account of this method of installation, it is more difficult to locate split pair faults accurately.,

Fig. 5 illustrates what is meant by a split pair. The wires C and F are connected straight through the cable, but D and E are cross-connected. If those two pairs are used for telephone service, there will be more or less cross-talk, depending upon the location of the transposition. Hence the need of locating the joint where the wrong connection has been made and rectifying the mistake. Some of the methods which have been used for locating split pairs are not reliable, giving only a rough approximation.

After a consideration of the former work presented in this paper, it will be seen that the same general methods may be employed provided we can make the capacity b fairly uniform throughout the cable, and then either measure it directly or

TABLE II

No of Fault	Length of cable	Actual distance to fault	Calculated distance to fault		Average error in feet	
			Other wires not grounded	Other wires grounded	Other wires not grounded	Other wires grounded
No 1	1098 ft.	208 ft.	176 1 ft. 234.5 ft.	189.9 ft. 205 ft.	— 2 7	—10.5
No 2	1098 ft.	208 ft.	238 ft. 252.5 ft.	237.6 ft 226 ft.	+37	+24
No 3	1021 ft.	557 ft.	——	569.8 ft. 581.5 ft.	——	+18.6
No. 4	1021 ft.	794 ft.	823 ft. 803 ft.	818 ft. 819 ft.	+19.	+24.5
No 5	987 ft.	265 ft.	193 6 ft. 203 8 ft.	209 6 ft. 181 9 ft.	—66 3	—69 2

TABLE I.

RELATIVE CAPACITIES = R IN FIG. 1.

Test between wires	Fault No. 1		Fault No. 2		Fault No. 3		Fault No. 4		Fault No. 5		Fault No. 6	
	m	*n*	*m*	*n*	*m*	*n*	*m*	*n*	*m*	*n*	*m*	*n*
$C D$	412	416.5	421	426.7		384	375	383	356	363	355.5	362.5
$F G$	419	427.5	419	422.5		380	379	383	368.5	376	367.5	375.5
$F' G'$	410	419				373.5			377	386	375.5	385.5
$C' D'$	403	412.5	420	427		381	382	385	376	378	372.5	377.5
Average = a	411.3	419	420	425 4		379.6	378.7	383.7	369.4	375.8	367.8	375.4
$C E$	344.5	358.5	343	357.5		324	313	324.5	304	313.5		
$C' E'$	342	359	344	359.5		328	307	320.5	301	314		
Average = b	343.2	358.8	343.5	358.5		326	310	322.5	302.5	313.8		
$C A$	357	373	354.5	369		360	371	380.5				
$C' B$	353.5	369.5	362.5	377		357.5	365	377.5				
Average = c	355.2	371.2	358.5	373		358.8	368	379	349.5	329.5		
$C B$	405	413.5	402	411		353	327.5	345.5				
$C' A$	398	407.3	401.5	411		353	325.5	341.5				
Average = d	401.5	410.8	401.8	411		353	326.5	343.5	361	369.5		
$F H$	348.5	361.5	354	363.5		325	318	328			297.5	313.0
$F' H$	335.5	352.5	354	365		330	316.5	327.5			302.5	315.5
Average = b	342	357	354	364.3		327.5	317.3	327.8			300	314.3
$F A$	370	376	369	375		363	368	374.5				
$F' B$	356	369	366	373		355	373	380				
Average = c	363	372.5	367.5	374		359	370.5	377.3			323.5	337
$F B$	408.5	417.5	407.5	414.5		354.5	334	340.5				
$F' A$	399	406.5	398	404.5		350	338.5	347				
Average = d	403.7	412	402.8	409.5		352.3	336.3	343.8			365.5	374

m indicates that other wires in cable were free and not grounded.
n indicates that other wires in cable were all grounded.

else eliminate it from equation (9). The first can be accomplished fairly well by grounding all the wires in the cable except those used in the test, and b can be eliminated from equation (9), as will now be shown.

Referring to Fig. 5, A, A', A'', and A''' represent four good pairs. C, D, E, and F represent the split pairs, C and F being connected correctly, D and E being cross-connected. The capacity between the wires of the individual pairs A, A', A'', and A''' should first be measured and the average taken as the value of a. It is not absolutely necessary to take just four pairs, but enough should be measured to insure a good average result.

As in the case of telegraph cables, we will let the capacity

$$\frac{CD+EF}{2}=c \text{ and } \frac{CE+FD}{2}=d$$

Now by referring to Fig. 5 we can say that the capacity b is equal to the capacity CE throughout the distance x added to the capacity CD throughout the distance y. Now as a is the capacity of a pair, we can say that a equals the capacity CD throughout the distance x added to the capacity CE throughout the distance y. This gives the relation $b=c+d-a$. Substituting this value of b in equation (9) we get

$$x=\frac{(a-d)L}{2a-(c+d)} \qquad (12)$$

Which is the formula to use for a split pair in a telephone cable.

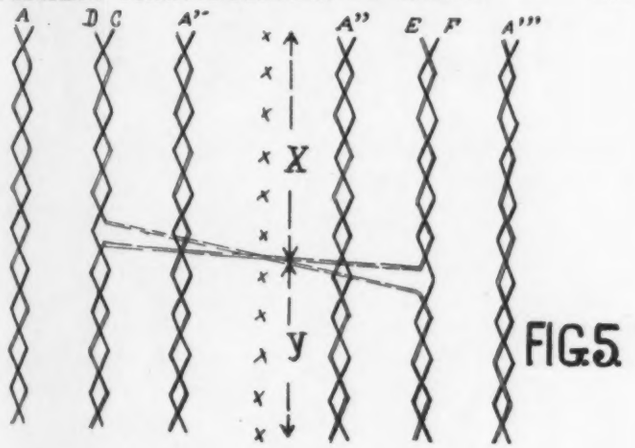


FIG 5

Referring now to Tables III and IV, faults No. 1, No. 2, No. 3, No. 4 were purposely made in 585 feet of 203 pairs No. 19 cable. There were two, three, four, and five pairs respectively, between the faulty pairs of each fault. It is evident that the farther the faulty pairs are apart the nearer correct is the fault location. Tests were not made in this case with all the wires except the test wires connected with the lead cover, or else a less error in feet would probably have been obtained. Faults 5 and 6 were in the No. 13 pairs of a combination cable consisting of 15 pairs No. 19 and 10 pairs No. 13.

It is a notable fact that the error in feet is much smaller when all the wires not used in each test were connected to the lead cover than when all the wires were free.

Some tests were made using a ballistic galvanometer and the discharge deflection method, and good results were obtained. This method would probably be used the most in practice, but there are testing sets where the resistance method and a telephone are used; these are especially suitable for locating faults of the kind herein treated. One of these designed by the writer is giving good satisfaction in commercial use.

TABLE III
RELATIVE CAPACITIES = R IN FIG. 1

Test between wires	Fault No. 1	Fault No. 2	Fault No 3	Fault No 4	Fault No. 5		Fault No 6	
	m	m	m	m	m	n	m	n
A	555	523	527	554	827	827	827.5	826.5
A'	537	530.5	540	576	832.5	833	839	838
A''	538	519.0	618	589	837	838.5	848.5	846
A'''	536	547.5	502	566	830	830	831.0	829.5
Average a	541.5	530	509	571.2	831.6	832.1	836.5	835
CD	505	472	466	478	681	710	762.5	770
EF	468	485	504	498	686.5	716	766	773.5
Average c	486.5	478.5	485	488	683.7	713	764.3	771.8
CE	497	469	469	479	756.5	764.5	679.5	714.5
ED	466	480.5	490	492	747.5	756.5	674.5	707.5
Average d	481.5	474.8	479.5	485.5	752	760.5	677	711

TABLE IV

No. of fault	Length of cable	Actual distance to fault	Calculated distance to fault		Average error in feet	
			Other wires not grounded	Other wires grounded	Other wires not grounded	Other wires grounded
No 1	586 ft.	293 ft.	305 6	——	+12 6 ft.	——
No 2	586 ft.	293 ft.	303 1	——	+10.1 ft.	——
No 3	586 ft.	293 ft.	302 3	——	+ 9.3 ft.	——
No 4	586 ft.	293 ft.	297.3	——	+ 4.3 ft.	——
No. 5	1155 ft.	433 ft.	404	433 7	—29. ft.	0 7 ft.
No 6	1155 ft.	759 ft.	797	765	+38 ft.	6.0 ft.

Conclusions.—Sufficient tests are not here given to enable any one to tell how successfully such faults could be located in practice, but the writer is of the opinion that relatively better results might be obtained, because the general average of many sections of cable would tend towards capacity uniformity, especially in telephone cables. The tests on telephone cables here recorded average better than those on telegraph cables. The methods would probably have a wider range of usefulness in telephonic than in telegraphic engineering work.

PROTECTING HIS RIGHT-OF-WAY.

A story which is going the rounds among telephone men in Missouri just now may be of general interest. A well-known right-of-way man said: "One morning a farmer found a score of our men putting up telephone poles through his field. He ordered the men out, but they wouldn't go. They showed him a paper which, they said, gave the authority to put up the poles.

"The old man looked at the paper, saw it was lawful and walked silently away. He went to the barn and turned a savage red bull into the field. As the bull made for the men, the men fled at the top of their speed, and the farmer shouted after them: 'Show him your paper.'"

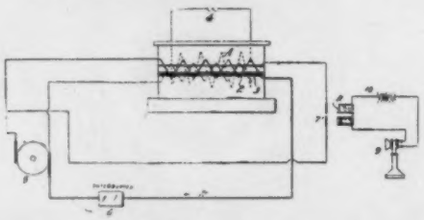
An old gentleman who had never used the toll lines and whose wife was in a distant city, wanted to communicate with her and could hardly be persuaded that it was possible to do so by telephone. When the connection was established and he was told to speak up, it happened that an electrical storm broke out just as he called out "Hello, Jane." Of course he got a "bang" in the ear, but with a pleased expression he turned around and said to his companion: "Land sakes, now ain't that natural. Just like Jane."—The Transmitter.

EXPERIMENTS IN WIRELESS TELEPHONY.

By C. F. Elwell.

Ever since wireless telegraphy has been successfully used in a commercial way, inventors have been at work on the problem of transmitting the human voice without wires. The reasons for this are manifold. A good telegraph operator cannot do much better than send 12 to 15 words per minute. Each word has to be translated to code and retranslated at the other end. Any one can understand the message when it is transmitted telephonically, and a speed of from 50 words upward can easily be obtained. Almost all the good arguments in favor of wireless telegraphy apply to wireless telephony. And in addition the very important one above mentioned. The field for wireless telephony is large,—from shore to ships, between ships at sea, between lighthouses and the mainland, between ships when traveling in squadrons, and for long distance overland, and other work.

Recently the writer has experimented with the McCarty wireless telephone patents illustrated herewith. In the Figure X, A is the mouthpiece leading to a tube connecting two transmitters. One is a microphone transmitter 3, which is connected to one primary 7, and the other is a make and break transmitter 4, which is connected to another primary 6 of an induction coil. The secondary winding of the induction coil is represented at 8 and is led to the spark balls 18, to which the aerial and ground are attached.



In the operation of the device, words spoken into the mouthpiece A will cause a vibration of both diaphragms of the transmitters. The effect of this variation of the current in the double primary is transmitted through the secondary winding and the spark balls to the aerial, and thence to any suitable receiver.

With this system I have obtained good results in the transmission of both speech and music over five miles. This distance is over land, and it is well known that it is much easier to transmit over water than over land. The ratio is considered by some to be two or three to one. These experiments have been carried out between the towns of Palo Alto and Mountain View, in Santa Clara County, California. An aerial of four No. 10 copper wires 100 feet long was used at each station, and the transmitting set consisted of a make and break transmitter shunted by a suitable capacity, and a 1½-inch induction coil, wound to conform to the patent specifications. The receiver best suited to the work seems to be the microphone coherer, consisting of a needle resting on a piece of carbon. This is put directly in the aerial and the coherer shunted by a dry cell and a common telephone receiver. The fluctuations in the resistance of the contact caused by the coherence and de-coherence of the needle to the carbon, caused by the passage of the high-frequency currents generated by the Hertzian waves on the aerial, cause similar fluctuations in the current flowing in the telephone receiver, and the human voice is reproduced. The mercury coherer was also successfully used and consists of a tube containing two small cylinders of steel, which have a small globule of mercury between them. Suitable adjusting screws are used and the results are quite reliable. The results show great clearness and there is none of the inductive effect common on wire lines. Any tendency to noise in the receiver can be shut out by adjustment of the coherer.

The method of procedure in these tests may be of interest. All the tests were carried out in one direction only, it not being considered important to work both ways, as a verification of the principle was all that was sought. The successful working in one direction readily proves the practicability of transmission in both directions. One does not want to talk when the other party is talking, and the same aerial is used for sending and receiving. All that is necessary is to cut out the coherer while talking, because the high-power currents impressed on the sending aerial would burn up the receiving coherer. This, for the present, can be done much as was done in the early days of the telephone, by means of a switch in the handle of the transmitter.

A schedule was pre-arranged, usually consisting of five minutes' talking and five minutes of rest, as it was found that the transmitters heated up when used for more than five minutes at a time. In the later tests the transmitter was used for forty minutes without a stop and showed only a slight sponginess of the platinum contacts. The assistants repaired to the sending station and one operator to the receiving station. A strict adherence to the schedule was emphasized and at the appointed time the operator at the receiving end put the receiver to his ear and adjusted the coherer for best results. As in all experimental work, periods would be obtained in which the results were very poor. Changes were suggested by means of the long-distance telephone until good results were obtained. The climate affects the results considerably, for tests given early in the morning, when there is a fog, were easily the strongest. The first tests were between two rooms about 75 feet apart. Then two stations 1,000 feet apart were obtained with 35-foot aerials. This proved successful, and 7,000 feet was the distance between the next two stations. These tests were not a great success, due to the aerial being too short at one end. Then two stations 4,000 feet apart were obtained and results were very good, and so an aerial was put up on the Mountain View water works and communication established with the Palo Alto water works, five miles distant on an air line. A correct design of coil for sending, a better mechanical transmitter, and a signal system will have to be worked out before the telephone will be marketable. Of these, the writer considers the transmitter the most formidable, as it has to carry quite appreciable amounts of current. The signaling is comparatively easy, as a means of ringing a bell over distance is well known.

The question is frequently asked relative to the tuning of wireless telephone stations. It is well known that a substantial difference in wave length will tune out a wireless message sent by means of the Morse code. With the telephone it is my opinion, from practical working, that it will be much easier to tune, for a small difference in wave length between the sending and receiving aerials gives results that are quite indistinguishable. The electrical constants have to be very closely the same in order to obtain good results.

The time may not be very far distant when we can have wireless telephone systems of a dozen or more telephones which will be quite independent of one another. Suffice it to say that there is nothing that strikes one more forcibly than to be able to receive spoken words with nothing more than an aerial, a coherer, dry battery, and telephone receiver. The cost of sets at each end will be so much less than a line to connect the points that a market is assured from the start in places where it is costly to run wires, and also where it is impossible to run wires.

LAW OF THE TELEPHONE.

By Emerson W. Read.*

The duty of indiscriminate service to all who comply with the reasonable regulations of the company is one which applies in common to all public-service corporations. Probably the duty can be enforced directly as a result of the fact that the company makes use of publicly owned facilities, as part compensation for the use of which the company must allow indiscriminate use of its facilities to all the public. That is to say, its franchise (as is generally the case in England and America) allows it to use public property exclusively in and to which all the public hold an interest and own a right equally; if in the exercise of that franchise privileges are granted and bestowed on one, then those same privileges must be so granted to others, on equal and similar conditions. Such a service is a condition to the grant of the franchise. No public legislative body holds the right to grant franchises for the use of public facilities except upon such conditions.

In the case of American Rapid Tel. Co. vs. Connecticut Tel. Co., 44 Am. Rep. 237, the Court, speaking on this duty, says: "If their system is carried into effect by instruments which are not the subjects of a patent, and they so conduct their business as to become common carriers of speech, they are to serve applicants with impartiality; or if it is carried into effect by instruments which are the subjects of patents of which patents they are the owner, the same result is to follow; . . . The Legislature may deny the use of highways for the erection of poles for the support of wires to any corporation which is not the full owner of telephonic patents by which its system is operated, and which is not able to give a perfectly unrestrained and impartial use of all their capabilities to applicants, or to any corporation which proposes to use telephonic patents under any restrictions whatever imposed by the owner, and so embarrass and hinder as to induce them to become full owners of such patents or retire from the service of the public. Legislatures, for reasons of public policy, in many ways put limitations upon absolute owners in the use of their property, but they cannot transfer the property of one to another without compensation, even for the public good." This case arose as one of a series constituting the Bell Telephone-Western Union Telegraph Company litigation. Its history is interesting.

When the telephone came first into general use the Western Union Telegraph Company secured a contract with the American Bell Telephone Company whereby it was agreed between the two companies that "in granting to other corporations and companies the right to use the telephone, and to establish telephonic exchanges, stipulated that they should not be used in receiving and delivering messages which had been sent over the wires of telegraph companies other than the Western Union Telegraph Company." It can be plainly seen that this constituted a complete monopoly in the hands of the Western Union Telegraph Company. In the numerous mandamus proceedings arising thereafter this contract was set up as a defense. In only one instance, that above referred to, American Rapid Tel. Co. vs. Connecticut Tel. Co., was this defense sustained. The case of State of Missouri vs. Bell Telephone Co. (23 Fed. Rep. 539) had previously held adversely to the right to so discriminate, a contract of a very similar nature having been entered into there.

Perhaps the case of State vs. Nebraska Telephone Co. (17 Neb. 126) as strongly shows the attitude of the courts in this matter as any. An attorney had had a difficulty with the telephone company because of his refusal to pay the rental of the telephone. As a result the company removed the telephone. On subsequent application for a telephone the company contended that his past conduct had forfeited his right to a telephone. The court declined to consider that issue, declaring that a plain method, a civil action, was open to the company to recover the rental due. A comprehensive discussion appears in the opinion: "It is said by respondent that it has public telephone facilities in the town of Lincoln, some of which are near relator's offices, and that he is entitled to and may use such telephone to its full extent by coming there; that, like the telegraph, it is bound to send the messages to relator, but it can as well do it from these public stations. Were it true that respondent had not undertaken to supply a public demand beyond that undertaken by the telegraph, then its obligations would extend no further. But as the telegraph has undertaken to the public to send dispatches from its offices, so the telephone has undertaken with the public to send messages from its instruments, one of which it proposes to supply to each person or interest requiring it, if conditions are reasonably favorable. That is the basis upon which it proposes to operate the demand which it proposes to supply. It has so assumed and undertaken to the public. That the telephone, by the necessities of commerce and public use, has become a public servant, a factor in the commerce of the nation and of a great portion of the civilized world, cannot be questioned. It is, to all intents and purposes, a part of the telegraphic system of the country, and in so far as it has been introduced for public use, and has been undertaken by the respondent, so far should the respondent be held to the same obligation as the telegraph and other public servants. It has assumed the responsibilities of a common carrier of news. Its wires and poles line our public thoroughfares and streets. It has, and must be held to have, taken its place by the side of the telegraph as a common carrier. The views herein expressed are not new. Similar questions have arisen in and have been frequently discussed and decided by the courts in holding that when a person or company undertakes to supply a demand which is affected with a public interest, it must supply all alike who are like situated, and not discriminate in favor of or against any. This reasoning is not met by saying that the rules laid down by the courts as applicable to railroads, express companies, telegraphs, and other servants of the public do not apply to telephones, for the reason that they are of recent invention, and were not thought of at the time the decisions were made, and hence are not affected by them, and can only be reached by legislation. The principles established and declared by the courts, and which were and are demanded by the highest material interests of the country, are not confined to the instrumentalities of commerce, nor to the particular kind of service known or in use at the time when the principles were enunciated, but they keep pace with the progress of the country, and adapt themselves to the new developments of time and circumstances. They extend from the horse with its rider to the stage coach, and from the sailing vessel to the steamboat, from the coach and steamboat to the railroad, and from the railroad to the telegraph, and from the telegraph to the telephone, as these new agencies are successively brought into use to meet the demands of increasing population and wealth. They are intended for the government of the business to which they relate, at all times and under all circumstances."

Another line of litigation has been invoked by legislative and municipal control over telephone companies. Legislatures throughout America, in the exercise of their constitutional rights, regulate the rates charged by certain public-service corporations. In each of such businesses more or less litigation has arisen out of the efforts of these companies to evade the operation of the State's rate legislation. In the case of the telephone numerous attempts have been made at various times to evade the rates provided by the Legislatures. Perhaps as ingenious an attempt as the case books show is that of Hockett vs. State (105 Ind. 250). Here the State of Indiana had fixed as a maximum rental the sum of three dollars per month on each telephone. To avoid this statute's operation the company made separate charges for the several instruments, all of which were absolutely essential for the sending of messages. But the court disposed of this contention by holding that the term

*B. L. L. L. B., Member of the San Francisco Bar.

"telephone" included the entire apparatus "ordinarily used in the transmission as well as the reception of telephonic messages."

Later, in an effort to evade this same Indiana statute, a company was convicted and punished for having exacted from the telephone subscriber the customary three dollars rental plus a charge imposed upon non-subscribers who used the same instruments (see Johnson vs. State, 113 Ind. 143).

After all possible schemes have been thus exhausted, the only possible means left for avoiding the operation of this regulating statute is to withdraw the company's instruments from the confines of the State. Being patented instruments, no doubt arises but that the patentee company may enjoin the use of their instruments in such a State so abandoned (American Co. vs. Cushman, 36 Fed. 488).

RECENT DECISIONS.

The poles and wires of a long-distance telephone, strung along a public road, are held, in Hoobs v. Long Dist. Tel. & Tel. Co. (La.) 7 L. R. A. (N. S.) 87, not to constitute an additional burden which will entitle the fee owner to compensation, unless he shows that there will be an actual and substantial injury to his property.

The decision of United States Circuit Judge Welborn, at Los Angeles, in the case between the City of Pomona and the Pacific Telegraph and Telephone Company, which raised the question of the power of the municipality to remove telephone posts from the streets, upholds the right of cities to prescribe and regulate the manner in which their streets shall be maintained, and declares that no foreign corporation has the right to erect poles and string wires without municipal consent.

UNITED STATES RECLAMATION SERVICE GENERAL SPECIFICATIONS FOR TELEPHONE SYSTEMS.

The United States Reclamation Service, of which F. H. Newell is director, is building a number of telephone lines in connection with the various irrigation projects being developed by it, and has found it advisable to draw up special specifications covering the construction of these lines. The following are the specifications as printed:

Pole Line.—The pole line will follow tangents and curves as shown in the drawings and will have the number of corners therein shown. An average of 30 poles per mile shall be used on tangents. The spans adjoining a pole on a curve at a corner shall not exceed 150 feet each for a pull of 5 feet, and the allowable length of span shall decrease 10 feet for each increase of 5 feet in the pull up to and including a pull of 30 feet. When a bend made on a single pole produces a pull of more than 30 feet, the pole shall be thoroughly braced and guyed and the adjoining spans shall not exceed 100 feet each, or such a bend shall be made on two poles and the lengths of the adjoining spans adjusted with the foregoing provisions relating to span and pull. The term "pull" as herein used means the perpendicular distance from the pole under consideration to a straight line joining the two adjacent poles. When a span of from 200 to 250 feet is necessary, the adjoining spans shall not exceed 100 feet each, and where a span of from 250 to 500 feet is necessary, the adjoining two spans at each end shall not exceed 100 feet each. On uneven ground the spans shall be so chosen and the poles so set as to avoid abrupt changes in the direction of the wire line vertically. In distributing poles, the heaviest shall be placed so far as practicable on corners and at the ends of long spans.

Poles.—Telephone poles shall be in general 5-inch poles 25 feet in length. At crossings of highways, railroads, and gullies, 6-inch poles of requisite length shall be used, and for this purpose ..... poles 30 feet in length and ..... poles 35 feet in length will be required. The poles shall be cut from growing red or white cedar trees, shall be reasonably unsightly wind twists, injurious butt rot, and other defects that materially impair them for the use intended. Butt rot in the center, including small ring rot outside of the center, the total of which does not exceed 10 per cent of the area of the butt, will be permitted. Sweeps not exceeding 1 inch for every 5 feet in length of pole will be permitted. The tops of seasoned 5-inch poles shall measure not less than 15 inches in circumference and those of 6-inch poles not less than 18 inches. If the poles are measured when green, 5-inch poles shall be not less than 16 inches in circumference at the tops and 6-inch poles not less than 19½ inches. The top of each pole shall be trimmed so as to form a right-angled roof.

Painting.—The roofs of poles shall be painted with two coats of the best quality of iron oxide paint.

Setting Poles.—On tangents the poles shall be set in a vertical position, and on curves and at corners they shall be raked 10 inches for a pull less than 5 feet, 15 inches for a pull of from 5 to 10 feet, and 25 inches for a pull of more than 10 feet. Each pole hole in earth shall be 5 feet in depth and shall be dug of sufficient size throughout to admit of tamping around the entire perimeter of the pole. On hillsides the depth of the holes shall be measured from the lowest side of the opening. Where the line crosses solid rock, pole holes shall be blasted to a depth of 3 feet, unless such solid rock can be covered by a single span not exceeding 250 feet. Each pole shall be carefully held in proper position while the hole is being filled. Filling holes with earth shall be done by one man and the earth firmly tamped simultaneously by three men. Rock debris when used for filling holes shall contain sufficient earth to fill all cavities therein and shall be homogeneously placed and thoroughly compacted. When the hole is filled, earth or rock shall be piled and firmly packed about the hole to a height of 1 foot above the original ground surface. The filling for holes and the general manner of setting poles shall be such as will enable each pole to withstand the strains to which it will be subjected.

Braces.—Braces shall be 5 inches in diameter at the top, shall be long enough to attach to the pole at two-thirds the height thereof above the ground, to make an angle of 30 degrees therewith and to extend into the ground at least 4 feet measured along the brace, and shall conform in all other respects to the specifications for poles ..... braces ..... feet in length, ... braces ..... feet in length, and ..... braces ..... feet in length will be required.

Setting Braces.—Each brace shall be set in the ground at least 3½ feet in vertical depth. The brace shall be cut slanting at the top to fit close to the pole and shall be attached to the pole with a ⅝-inch bolt supplied with a washer at each end. This bolt shall be placed at the lowest point of the joint. In fitting the brace to the pole all trimming shall be done on the brace.

Guys and Anchors.—Guys shall consist of No. 6, B. W. G., galvanized steel wire. Guy anchors in earth shall consist of galvanized cast-iron plates and galvanized-iron rods. Each cast-iron plate shall be 8 inches square and ½ inch thick and shall be provided on the lower face with a cylindrical lug at the center having a diameter of 2 inches and a height of 1½ inches and with diagonal ribs ⅓ inch thick rising from zero elevation at the corners and terminating in the cylindrical lug with elevation equal thereto. Each cast-iron plate shall have a ¾-inch cored hole through its center for the reception of the anchor rod. Each galvanized-iron rod shall be ⅝ inch in diameter and 6 feet in length and shall be provided at the upper end with a suitable eye and a wire-rope thimble for a ¼-inch rope and at the lower end with U. S. standard threads and a galvanized-iron nut. Guy anchors in rock shall consist of galvanized-iron rods of the combination eye and wedge-bolt type 1 inch in diameter and 18 inches in length, each provided with a suitable wedge and a wire-rope thimble for a ¼-inch rope.

well proportioned for their length, and shall be peeled, neatly trimmed, well seasoned, reasonably sound and free from

Placing Guys and Anchors.—Each guy shall be attached to the pole immediately below the bracket by making two turns around the pole and wrapping the end eight times around the guy, and shall be secured to its rod by passing around the thimble and terminating on itself in eight turns. The turns about the pole shall be secured by at least three 2-inch galvanized-iron staples. The angle between the guy and its pole shall be as nearly 45 degrees as is practicable. Anchors in rock shall be securely fastened in holes so drilled therein as to give the anchors the greatest possible efficiency. Holes for anchor plates shall be dug at least 3½ feet in vertical depth.

Guying and Bracing.—Guys and braces shall be placed wherever considered essential by the engineer. On tangents and on curves having pulls less than 10 feet, double side guys will be required about every 1,000 feet of line; and on curves or at corners where the pull is from 10 to 30 feet each pole shall be provided with a guy or brace. On curves and at corners each pole at which the pull exceeds 30 feet shall be provided with either a guy or a brace placed in the plane of each of the adjoining spans and the adjacent poles shall be provided with appropriate supplemental bracing or guying. At least one head and one back guy shall be installed on every mile of line. Additional head and back guys or braces shall be used wherever the slope of the ground, length of span, change in direction or extra pole height at road crossings requires them for stability.

Brackets (ground circuit).—Pony telephone side brackets 1½x2x10 inches shall be used. They shall be made of the best quality of well-seasoned, sound, straight-grained oak, free from knots and sapwood, shall have the insulator threads truly cut and complete, and shall be painted with two coats of the best quality of iron oxide paint. Each bracket shall be securely fastened to the pole with one 40d and one 60d galvanized wire nail in such a position that the base of the bracket will be about 14 inches below the top of the pole. Where the change in direction of the wire at any pole is more than 60 degrees, an extra bracket shall be used. Brackets shall be placed on the same side of all poles except on curves or at corners, where they shall be so placed that the strains produced by the wires will tend to press the insulators toward the poles.

Brackets (metallic circuit).—Pony telephone side brackets 1½x2x10 inches shall be used. They shall be made of the best quality of well-seasoned, sound, straight-grained oak, free from knots and sapwood, shall have the insulator threads truly cut and complete, and shall be painted with two coats of the best quality of iron oxide paint. Each bracket shall be securely fastened to the pole with one 40d and one 60d galvanized wire nail. Where the change in direction of the wire at any pole is more than 60 degrees, an extra bracket shall be used for each wire. On tangents the brackets shall be placed one on each side of the pole and on curves and corners they shall be so placed that the strains produced by the wires will tend to press the insulators toward the poles. The top bracket shall be so placed that its base will be about 14 inches below the top of the pole, and the bottom bracket so that its base will be 12 inches below that of the top bracket, except on transposition poles on tangents. On transposition poles on tangents the brackets shall be at the same elevation so placed that the insulator for each wire will be as nearly as practicable on a straight line between those for the same wire on the adjacent poles. On transposition poles on curves the bracket shall be so placed that the transposition insulator will be as nearly as practicable on a straight line between the insulators for each wire on the adjacent poles.

Insulators (ground circuit).—Standard pony, glass, 10-ounce insulators shall be used. They shall be made of common glass, shall be free from cracks, blow-holes, flaws, and sharp edges, and shall have smooth threads of uniform pitch accurately fitting the threads on the brackets.

Insulators (metallic circuit).—Standard pony, glass, 10-ounce insulators and two-piece transposition insulators of equivalent strength shall be used. They shall be made of common glass, shall be free from cracks, blow-holes, flaws, and sharp edges, and shall have smooth threads of uniform pitch accurately fitting the threads on the brackets.

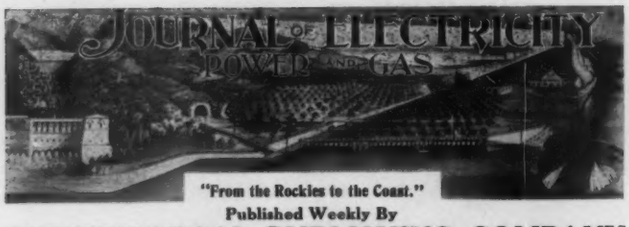
Line Wire.—The line wire shall consist of No. 12, B. W. G., galvanized-iron wire of the quality known as "Best Best," having an average resistance of 68 degrees F. not to exceed 33½ ohms per mile. The wire shall be of uniform cross-section, shall weigh approximately 165 pounds per mile, shall have an ultimate tensile strength of not less than 545 pounds, and shall be capable of withstanding at least 15 twists about its axis in a length of 6 inches. It shall be soft and pliable and capable of elongating 15 per cent without breaking, after being galvanized. The diameter of the line wire in inches shall be not more than 0.113 nor less than 0.106. The wire shall be furnished in coils of one-half mile continuous lengths, without welds, joints, or splices, and each coil shall be drawn from a rod without welds, joints, or splices of any kind. The galvanizing shall consist of a coating of zinc evenly and uniformly applied in such a manner that it will adhere firmly to the surface of the iron. The galvanizing shall be of such quality that clean, dry samples of the galvanized wire shall appear black when they are four times alternately immersed for one minute in a saturated copper sulphate solution and then immediately washed in water and thoroughly dried.

Stringing Wire.—The wire shall be strung with as few joints as possible and shall be joined by twisting the wires for a distance of about 3 inches around each other two complete turns and soldering, the end of each wire terminating in five tightly fitting contiguous turns around the other wire. The line wire shall be tied to the insulators with tie wires of No. 12, B. W. G., galvanized-iron wire cut in suitable lengths. The line wire shall first be laid in the groove of the insulator on the side away from the pole, after which the tie wire shall be passed entirely around the insulator and line wire and terminate at each end in five tightly fitting turns around the line wire. The tension on the line wire for each span shall be in the judgment of the engineer as high as will be safe for the minimum temperature for the locality.

Transposition (metallic circuit).—In general a transposition of the line wires shall be made once in each mile, but the exact number and location of transpositions shall conform to the local requirements therefor. On tangents each transposition shall be made without the use of transposition insulators by interchanging the wires laterally in one span and vertically in the two succeeding spans. On curves each transposition shall be made by the use of a transposition insulator.

Trimming Trees.—All trees along the line of such character and location as to render them liable to being blown over so as to interfere with the telephone wires shall be cut down and removed or burned, and all trees close to the line that in the judgment of the engineer will not endanger the telephone wires shall be so trimmed as to leave a clear space of 10 feet about telephone wires in all directions under stress of the heaviest probable wind storms.

Lightning Rods.—Lightning rods consisting of No. 12, B. W. G., galvanized-iron wire shall be installed throughout the line at intervals of about one-third mile. Each rod shall be located about one-fourth the distance around the pole from the bracket and shall be attached to the pole with 2-inch galvanized-iron staples. The upper end of each rod shall project about 3 inches above the top of the pole and the lower end shall terminate beneath the butt of the pole in a flat coil containing about 6 feet of wire.



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MEASURED TELEPHONE RATE.

"History repeats itself" in telephony, as in all things else. At present the telephone company at Berkeley, California, a trans-bay suburb of San Francisco, is being discussed because it is installing a nickel-in-the-slot service for the use of non-subscribers. The local press, dependent upon popular support, is conducting the usual campaign of threatening abuse, as has been done numberless times before.

We merely cite this case as a type of the conditions that all telephone companies must meet in rapidly growing communities. Having become accustomed to the telephone as a transmitter of village gossip, it is difficult for some people to comprehend that this instrument has become one of the greatest necessities of the business life of a town. When complaints are made that important business matters cannot be communicated because the "line is busy" with trivial messages, the company has but one recourse,—to install a measured service. Such service restricts the number of social calls and increases the general efficiency. In other words, the telephone is not a toy for idle moments, but a vital necessity of our modern life. The further restriction of a time limit would add even more value to the service by curtailing the length of these pleasant telephone visits.

The "butcher, the baker, and the candlestick maker" do not furnish unlimited service at a flat rate, and no more should be expected from a telephone or electric power company. Moreover it is just neither to the subscriber nor to the company that a non-subscriber should have free use of a telephone line rented by an accommodating neighbor. This is often carried to the extreme, particularly in drug stores, which allow free service to all comers.

As already noted in these columns, this custom was discountenanced in August of this year by the decision of Judge Griffin, of the Superior Court at Seattle, Washington. The court held that "the company is not obliged, under its franchise, to furnish unlimited service for the free use of the public at the rate charged, and is justified in disconnecting the telephone of which such unauthorized use is made." Most stores now recognize that orders for goods cannot be received over a busy line, and they have consequently voluntarily discouraged the practice. Under the flat-rate system the man having a few calls per day pays a part of the bill of the man having many, which is manifestly unjust to the small user.

It is a far better system in which the public pay for what they get. The flat rate may have its position in the small towns, but as traffic grows simultaneously with the growth of a town, the measured rate soon becomes the more equitable.

RESOLUTION FOR THE ENCOURAGEMENT OF RIGHTS OF WAY FOR ELECTRIC POWER COMPANIES

After a lengthy discussion the follofwing resolution, presented by Judge Frank H. Short on Fresno, California, was passed at the Irrigation Co gress recently closed at Albuquerque, New Mexico. Insomuch as it was one of the most important and far-reaching results of this convention, we publish it in full:

"This Congress recognizes the growing importance of the development of electric power, not only for purposes of lighting, manufacturing and commerce, but also in aid of irrigation by pumping from subterranean sources. Developments already accomplished in this direction warrant the assumption that, in the not far distant future, the lands irrigated by water pumped from such source will equal, if they do not exceed, lands irrigated from the natural flow of streams. The development and use of our streams for the generation of electric power not only aids and increases irrigation directly, but is beneficial in many other ways. First, it renders possible and profitable the construction of reservoirs in the high mountains withholding excessive floods, thus aiding reclamation and also conserving this injurious flow which is later added to the beneficial flow of water available for irrigation. Second, it is the one great source of supply immediately available for lighting, heat and power as a substitute for other fuels, thus limiting the rapid destruction of our forests and also conserving and saving our supplies of coal and other fuels. Third, the use of electricity for pumping renders it possible permanently to reclaim and irrigate vast sections of our arid land otherwise impossible of reclamation or irrigation. Fourth, its extensive development will cheapen and extend manufacturing and commerce, thus affording an immediate home market for the products of our irrigated farms and also cheaper transportation to other markets.

"Therefore Be It Resolved: That the necessary rights of way and rights for the construction of reservoirs, and other uses of the public lands, for the development of electric power, should be aided and encouraged in every reasonable way, and all such rights and uses should be granted and allowed upon equal terms with similar rights granted for the direct purpose of irrigation. Such uses, being public uses subject to the control of the State, should continue as long as the right to the beneficial use of the water and the duty to supply the power continues under State laws. And no burdensome charges or discriminations should be exacted or imposed, as a result of which such beneficial developments may be delayed and the investment of capital therein prevented and the cost increased to the consumer."

PERSONAL.

S. E. Gates has joined the Portland, Oregon, staff of the General Electric Company.

John R. Cole and John Sutton have returned from a trip North, including Seattle and Portland.

E. Y. Porter has opened offices at 702 South Spring Street, Los Angeles, as an illuminating engineer.

Ira J. Francis, Los Angeles manager of the John A. Roeblings Sons Co., was in San Francisco this week.

Robt. Howes has opened an office as consulting engineer in hydro-electric work, in the American Bank Building, Seattle, Washington.

Irving W. Philipps has been appointed electrical engineer with the Compania Minera y Exploradora de Ventanas, at Ventanas, Durango, Mexico.

E. M. Scribner, vice-president and general manager of the Technical Publishing Company, of San Francisco, has returned, after an extensive trip East.

L. L. Smith, formerly with D. C. & W. B. Jackson, Chicago, is chief engineer and general manager of the Beatty Milling, Mining & Reduction Company, at Beatty, Nevada.

W. G. Wurth, formerly State superintendent for Indiana of the Central Union Tel. Co., and until recently on the engineering staff of the American T. & T. Co., is in San Francisco.

OPPOSITION TO SLOT MACHINES.

The Pacific Telephone & Telegraph Company is meeting with considerable opposition in its efforts to install telephone slot machines in Berkeley, California. This opposition was crystallized in an ordinance introduced at the meeting of the Board of Trustees of the town of Berkeley, held on October 6th, which is as follows:

Be it ordained by the Board of Trustees of the Town of Berkeley, in the State of California, as follows:

Section 1. A license of twenty-five dollars per month, payable quarterly in advance, must be paid by any person, firm or corporation operating or maintaining a nickel-in-the-slot telephone attachment. Any person, firm or corporation operating or maintaining more than one such nickel-in-the-slot telephone attachment shall pay a license of twenty-five dollars per month for each such telephone attachment so operated.

Section 2. Any violation of this ordinance shall be punished by a fine of not more than five hundred dollars, or by imprisonment in the county jail for not more than sixty days, or by both such fine and imprisonment. The person or corporation owning such telephone attachment and the person allowing such telephone to be installed or maintained in his place of business shall be both equally guilty for a failure to pay the license mentioned.

Section 3. This ordinance shall take effect and be in force from and after its final passage.

The ordinance as introduced has been referred to the City Attorney for opinion, and will probably come up again at the next regular meeting of the Trustees.

PROGRAM OF THE SIXTH ANNUAL MEETING, ORDER OF REJUVENATED SONS OF JOVE.

October 14, 15 and 16, 1908, Hotel Iroquois, Buffalo, N. Y.

WEDNESDAY, OCTOBER 14TH

8:00 p. m.—Reception at Hotel Iroquois.

10:00 p. m.—Badger Fight between an Arizona badger and a Boston bulldog. (E. M. Scribner, No. 1262, bringing a 60-pound fighting badger, with a Pacific Coast reputation, and Alex Henderson, No. 343, furnishing a 42-pound bull bitch, which he is willing to back to the limit.)

THURSDAY, OCTOBER 13TH.

9:00 a. m.—Special train to "The Roycrofters," at East Aurora, N. Y.

10:30 a. m.—Address in the Chapel, by Elbert Hubbard—better known as "Fra Elbertus."

12:15 p. m.—Luncheon at the Pholanstery.

2:40 p. m.—Business meeting at Hotel Iroquois—Reports of Auditing, Finance and Reorganization Committees, and reports from the officers of the Sixth Jovian Congress.

8:00 p. m.—Illuminated Jovian parade—a marvel of electrical effects, music, fireworks, imps, victims, and police.

9:00 a. m.—Grand rejuvenation at the Cathedral of the Scottish Rite Masons.

11:00 p. m.—Joviation—Dutch lunch, music, songs, and some speeches.

FRIDAY, OCTOBER 16TH.

10:00 a. m.—Unfinished Business: Under this head will be a general discussion as to the needs of the Order.

1:00 p. m.—Standing luncheon.

2:30 p. m.—Election and installation of officers.

7:00 p. m.—Banquet.

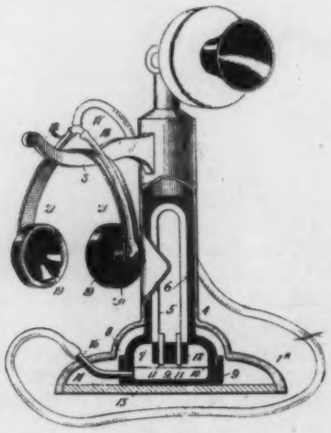
A. I. E. E. CATALOGUE OF WHEELER GIFT.

The bibliographical catalogue of the books, pamphlets and periodicals of the celebrated Latimer-Clark collection presented by Dr. Schuyler Skaats Wheeler to the American Institute of Electrical Engineers, has just been completed, and is about to go to press. This critical catalogue has been in preparation for the past six years, under the direction of Mr. W. D. Weaver, with the collaboration of Brother Potamian, of Manhattan College, and a number of other authorities here and abroad. The expense of this unique work has been defrayed by Mr. Andrew Carnegie. As soon as the book comes from the press, it will be distributed to the members of the Institute, who, according to the deed of gift of the library, are entitled to the catalogue.

PATENTS

TELEPHONE SET. 898,796. Sol S. Sonneborn, New York, N. Y. Filed Oct. 1, 1907.

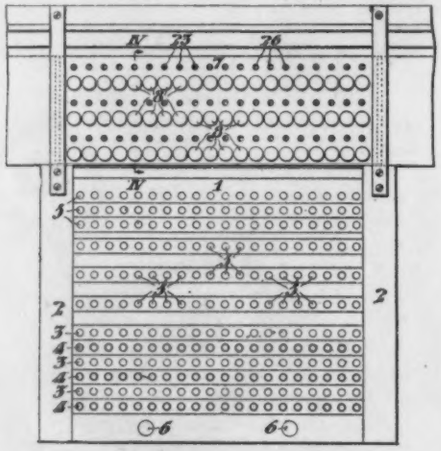
In a desk telephone, a hollow standard or column having a transmitter and a switch hook, said standard being enlarged



at its base to form a correspondingly enlarged interior cavity, a telephone receiver having a longitudinal magnet co-axially contained in and forming part of said standard, said receiver having its diaphragm end within said enlarged portion of the standard, an ear cup or piece, and tubular connections therefrom to said receiver.

TELEPHONE SWITCHBOARD. 899,278. Charles E. Wilson, Philadelphia, Pa., assignor to Keystone Telephone Company of Philadelphia, Philadelphia, Pa.

In a telephone switchboard, the combination with a group of answering jacks arranged in vertical and horizontal rows; a

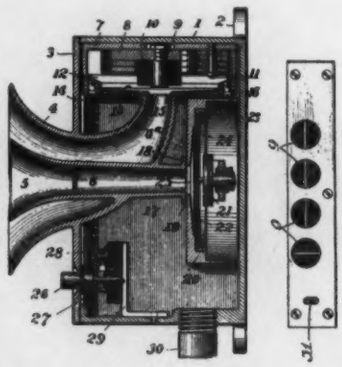


group of multiple jacks above the answering jacks and correspondingly located; and a separate group of independent manually operated call-registering devices arranged in similarly grouped rows above the multiple jacks, said individual registering devices being arranged in the same relative position in their group as are the corresponding answering jacks and multiple jacks in their group.

PARTY LINE INDICATING KEY. 899,024. Clifford C. Bradbury, Chicago, Ill., assignor to Kellogg Switchboard and Supply Company, Chicago, Ill.

In an operator's indicating key, a plurality of switch-actuating buttons, each button having a normal unactuating position, a depressed actuating position, and a partially rotated unactuating indicating position.

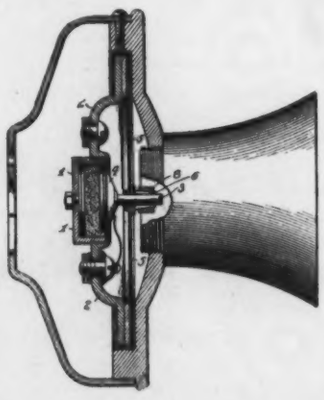
TELEPHONE APPARATUS. 898,619. Frank W. Wood, Newport News, Va., assignor to Charles Cory and John M. Cory, New York, N. Y.



A telephonic apparatus comprising a concentrically arranged mouthpiece and trumpet, the one projecting through the wall of the other.

TELEPHONE TRANSMITTER. 898,544. Henry F. Albright, Elizabeth, N. J., assignor to Western Electric Company, Chicago, Ill.

In a telephone transmitter, a diaphragm having a central opening, a button at the rear of said diaphragm having a stem

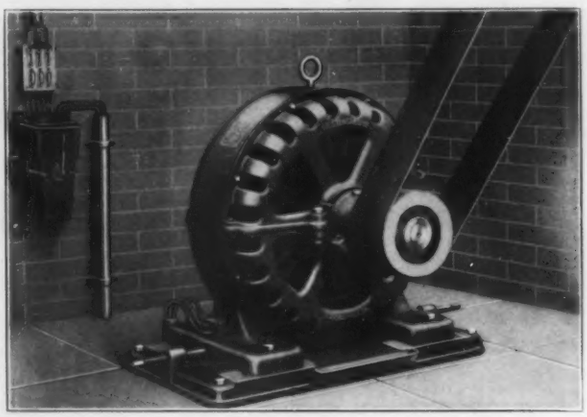


projecting through said opening, a bushing upon the front face of said diaphragm about said opening, said bushing having an opening tapering from its intermediate portion toward each end, and means for clamping said bushing about said stem.

INDUSTRIAL

TYPE CCL POLYPHASE INDUCTION MOTORS.

Polyphase induction motors of the squirrel-cage type offer advantages for many installations superior to those of any other type of motor. The absence of sliding contacts makes possible extremely simple construction, with no wearing parts except the bearings. Absolute freedom from sparking is assured; these motors can be used with perfect safety in locations surrounded by inflammable or explosive material. The line connections are made to the stationary element when the motor is installed, and no further connections are necessary. The rotating element is practically indestructible. Simplicity of construction and operation, and low cost for attendance and maintenance are among the marked advantages of this type of motor.



Type CCL Westinghouse Polyphase Induction Motor.

Having been a pioneer in the field of alternating-current motor production, and since the installation of the first motor a leader in promoting their use, the Westinghouse Electric & Manufacturing Company is especially qualified to produce thoroughly reliable polyphase induction motors. The Westinghouse type CCL motor possesses all the advantages inherent in this type. It is characterized by great strength of parts, large self-oiling bearings that seldom require attention, high starting and pull-out torque, large overload capacity, low operating temperature, practically constant speed, and high efficiency and power factor.

Type CCL motors are built in all commercial sizes from one-half horsepower up to several thousand horsepower. Standard sizes for slow and moderate speeds on two and three phase circuits are as follows:

From ½ to 200 horsepower, inclusive..25 and 60 cycles.

From 1 to 75 horsepower, inclusive.....40 cycles.

Standard CCL motor frames are numbered consecutively according to size from 1 to 16. The same general characteristics and the same general form of construction follow through the whole line.

The smaller sizes are built for 100, 200, 400, and 550 volts; motors of 30 horsepower and larger are built also for 1,000-1,100 and 2,000-2,200 volts.

A type CCL motor can drive its load through a belt or gear or can be direct connected. The motor can be arranged for operation with a horizontal or a vertical shaft. The horizontal-shaft motor can be equipped with back gears and a countershaft.

Squirrel-cage induction motors are essentially constant-speed machines. At no load, that is, running light, the speed is synchronous, depending on the frequency of the supply of the current and the number of poles for which the motor stator is wound. When the motor is driving a load the speed is less than synchronous, the decrease from synchronous speed being known as the slip. The slip of any induction motor varies with the load and depends on the resistance of the secondary, that is, of the rotor conductors and their short-circuiting end rings. The greater the load, the greater the slip, and the higher the resistance of the secondary, the greater is the slip at any given load. The slip is usually expressed in per cent of synchronous speed; thus, 5 per cent slip means that the speed is 5 per cent less than synchronous speed.

The greater the slip of an induction motor the greater is the starting torque, or turning moment, per unit current. On the other hand, large slip is accompanied by increased losses and decreased efficiency. In the type CCL motors a conservative medium course has been adopted. The slip is high enough to give good starting torque without requiring excessive starting current, while at the same time good commercial efficiencies are obtained. The slip at full load varies with the size of the motors between the approximate limits, 7 per cent in the smallest size down to 3 per cent in the larger sizes.

The starting torque per ampere current input compares very favorably with that of any other squirrel-cage induction motor on the market. The maximum running torque, or the pull-out torque, is from two to two and three-fourths times the full-load torque. Type CCL motors are therefore especially adapted for service where they may be subjected to sudden and heavy overloads.

The efficiency of any motor, or the ratio of the output to the input, varies with the load. For most economical operation this variation should be as little as possible over the working range of the load. The efficiency of a type CCL motor is very nearly constant at all loads from one-half load to one and one-fourth load, the maximum being attained at some point between three-fourths load and full load. Since motors usually operate at loads between the limits indicated, it will be seen that type CCL motors meet the conditions for most economical operation.

Especial attention is called to the low temperature rises and large overload capacities of type CCL motors, as these features are better than are usually offered. At rated voltage and frequency the following temperature rises above the surrounding atmosphere can be guaranteed, all temperatures to be measured by thermometer:

Full load continuously.....40° C.
Twenty-five per cent overload continuously..50° C.
One hour at fifty per cent overload.....60° C.

Type CCL motors will operate successfully on circuits of which the voltage is within ten per cent of that at which the motors are rated. They will also operate successfully at some variation from normal frequency. For example, the 60-cycle motors can be operated at 66 2/3 cycles or at 50 cycles.

NEW PASS & SEYMOUR DEVICES.

P. & S. No. 3,010 and No. 460, illustrated herewith, are two new and novel devices which fill a hitherto unsupplied demand. No. 3,010 is known as a feed-through switch, from the fact that the cord passes through the switch. The uses for such a switch are many, as oftentimes in certain work such as small sewing-machine motors, stereopticons, heating devices, etc., it is desirable to cut a switch into the cord instead of placing the switch at the end of the cord or using a wall switch. This device is wired up by simply passing the cord into the upper bushing—connecting one wire to terminals—and passing the cord out through lower bushing. Only one wire is cut, the other passing right through. It is National Code.

P. & S. Feed Through Switch

P. & S. Socket with All-Metal Key.

The No. 460 socket is the only socket on the market with the all-metal key. P. & S. sockets are the only ones in which this can be accomplished, as the design is of such a nature that the mandrel is at all times "dead." The demand for this socket comes principally from the manufacturers of fixtures, portables, and the like, who wish a socket with a key to match the finish of the fixture. All the P. & S. brass shell sockets and receptacles may be equipped with this key, for which a slight additional charge is made.

For some time the trade has had some difficulty in securing P. & S. devices from jobbers' stocks on the Pacific Coast. Pass & Seymour, Inc., make an interesting announcement in the advertising pages of this issue, which no doubt will be welcome news to users of P. & S. goods. P. & S. devices may now be procured from the large jobbers in the principal jobbing centers. Some jobbers not mentioned in the announcement also carry a stock of some of the devices, and are rapidly extending the stock, so it will not be long before P. & S. goods are on sale by all of the Pacific Coast jobbers.

NATIONAL BATTERY CO. RECEIVERSHIP ENDS.

Announcement is made by the National Battery Company, of Buffalo, N. Y., that the receivership under which this company has been operating since last February was terminated August 19th. All claims against the National Battery Company have been settled and the entire property has been restored to the stockholders. It is also stated that full control of the reorganized company has been secured by the Cutler-Hammer Manufacturing Company, of Milwaukee, well known as makers of battery-charging rheostats and other electric controlling devices. The plant of the National Battery Company will remain at Buffalo, but the business will be conducted under new management and with ample capital.

A NEW 25-WATT TUNGSTEN LAMP.

The illustration in the General Electric Company's adver tisement in this issue shows the latest addition to the line of tungsten incandescent lamps for standard lighting circuits (100 to 125 volts) that is being placed on the market by the General Electric Company. This is a 25-watt, 1 to 1¼ watt per candle lamp made in a practically identical bulb to that used for the ordinary 16-candlepower carbon lamp. The illustration shows the exact size of the lamp, which has the same diameter and base and approximately the same length as the familiar 16-candlepower unit.

This lamp will burn in any position and its size adapts it for use in any shade or fixture suitable for the 16-candlepower carbon lamp. It can be substituted, therefore, lamp for lamp in all present installations.

At 1¼ watts per candle the 25-watt lamp gives 20-candlepower, or 25 per cent, more light than the ordinary 16-candlepower lamp. The energy consumed is one-half that of the best 16-candlepower carbon lamp and considerably less than one-half the energy consumed by a 16-candlepower carbon lamp of similar life—800 hours.

The General Electric Company, as previously announced, has been greatly increasing its manufacturing facilities and is now prepared to manufacture this lamp, together with the 40, 60, 100, and 250 watt lamps, at the rate of 35,000 lamps total output per day.

Ample stocks of the larger lamps are carried at the main lamp sales office in Harrison, N. J., and at the various local sales offices throughout the country. The stock of the new 25-watt tungsten is at present somewhat limited, but the factory capacity is ample to maintain a reasonable delivery on all ordinary orders.

The list price of the new lamp is 85 cents plain and 90 cents frosted, subject to the regular discounts adopted September 1st. As the lamp will burn in any position and can be substituted in the regular course of renewals, it will undoubtedly find a large market among isolated plants, with the accompanying saving in the coal bill and the opportunity of doubling the number of units and nearly trebling the candlepower with the same equipment. It should also be gradually introduced on the circuits of central stations as rapidly as customers can be educated to appreciate its advantages.

MEXICAN BUSINESS.

The Phillips Insulated Wire Company, of Pawtucket, R. I., has established a warehouse and office, under the name of Cia Mexicana de Alambre "Phillips," at 14A De Guerrero, 5526, Mexico, D. F. They will carry at that point a complete stock of their well-known brands of O. K. weatherproof, Parac rubber-covered and bare copper wire, with a competent sales department to develop business. The trade in that section has been largely in the hands of English and German manufacturers, and it is hoped that this venture on the part of the Phillips Company will result so successfully that it will encourage other domestic manufacturers to follow their lead.

NEWS NOTES

TELEPHONE.

Stites, Idaho.—McDaniels' pack train of 22 mules carried supplies recently from Stites, Idaho, for a telephone line between Elk City and Oro Grande.

Payette, Idaho.—At Payette, the Boise Independent Telephone Company are installing an addition to their switchboard, to accommodate the increased toll and rural line business.

Auburn, Cal.—The Utah Construction Company, which is building the new Southern Pacific cut-off between Roseville and Colfax, is arranging for telephone service at each of its camps.

Rawhide, Nev.—The recent fire in Rawhide put the telephone office of the Fairview Telegraph & Telephone Company out of commission for a few hours, but it was re-established in a few hours, and doing business.

Los Angeles, Cal.—The Pacific Electric Railway Company has decided to install in all of its stations sound-proof booths, with Baird automatic coin collectors. There will be one booth in each of its stations, and six in the main station at Los Angeles.

Mountain Home, Idaho.—Mr. J. A. Sewell, of Duck Valley, Indian Reservation in Idaho, has completed a telephone line to Mountain Home, 128 miles distant. This gives connection from Mountain Home to the existing telephone systems radiating throughout the reserve.

Crawford, Idaho.—The territory at Crawford, Idaho, including a number of small exchanges and several toll lines, has been sold by the Independent Long Distance Telephone Company, of Boise, to the Inter-Mountain Telephone & Telegraph Company, of Crawford, Idaho. This company is composed of local people, who intend developing the telephone system throughout that section.

On August 16th, in a fire which destroyed the business center of Tehama, California, the Telephone Exchange was burned to the ground. The fire occurred at 9 o'clock p. m. Manager Brown, of Red Bluff, upon receiving the news, left with a crew of men for Tehama at 5 a. m. the next morning and at 7 a. m. had toll-line service restored to and from Tehama. At 7:30 p. m. on the 18th all local and farmer lines were in full operation.

Spokane, Wash.—F. J. McGougan, city manager of the Pacific States Telephone & Telegraph Company, announces that no more four-party telephones will be installed in Spokane. That means that the minimum rate in Spokane is now $2 a month, and that 5,672 of the 14,000 patrons will pay $24 a year for their telephones instead of $18, if they consent to take the two-party line, as is now being urged by the telephone company. To change these to two-party lines will mean an increased revenue of $34,000 a year for the company.

Kellogg, Idaho.—Directors of the North Idaho Telephone Company at Kellogg, Idaho, decided to put on additional men and rush the work of extending the telephone service in the Coeur d'Alenes. Twenty men will be put to work in Wallace stringing wires for the local exchange. Three cars of poles have arrived. Manager Van Dyke says the company has 115 instruments in Kellogg and Wardner and 15 in Wallace. He expects to increase the number in Wallace to 450 within four weeks.

Mullan, Idaho.—With the extension of the Interstate Telephone Company's line to Larsen, near Mullan, Idaho, now nearly complete, the construction work planned by that company for the year will end. It is given out that early next year the lines will be carried over the summit to connect with various Montana lines. The completion to Larsen gives Wallace communication with Ponderay, Idaho. Thomas L. Greenough, one of the controlling capitalists in the Honduras smelter, recently invested $50,000 in the Interstate company.

Elko, Nev.—The recently-organized Nevada, Utah & Idaho Telephone Company, of which Mr. W. L. Thomas is the moving spirit, is making an effort to consolidate the various independent telephone interests throughout the mining sections of Nevada. At present there are a dozen or more isolated companies with no toll connection, and it is the intention of the new company to furnish this. As a preliminary, they have recently completed a single ground iron line between Elko an Salt Lake City, which connects with the Rocky Mountain Bell Telephone Company.

Spokane, Wash.—Charles W. Reynolds, district manager of the northern division, composed of Washington, Idaho, and Oregon, announces that the Pacific Telephone & Telegraph Company will install a branch exchange in the eastern part of Spokane, to cost $150,000. It will be equipped to handle 5,000 subscribers. The cable work will be done this fall and building is to begin early in the spring. Two other substations are to be erected in 1909. Mr. Reynolds added that work now in hand in this city will cost $256,000. The company has doubled its facilities between Spokane and Coeur d'Alene, Idaho, 34 miles east of Spokane, where the Rocky Mountain Telephone Company is also doubling its lines. The Pacific company will soon begin work on additional toll lines to all points tributary to Spokane, with the idea of doubling its present facilities to Yakima, Walla Walla, and several cities in Eastern Washington and Oregon. This work will cost about $90,000. The work will be under the personal supervision of Mr. Reynolds, until recently manager of the company's property in Spokane. The company has just completed its northside exchange, with 3,200 instruments. It is equipped to serve 3,700 and can be enlarged to handle 7,400. The company now has 14,000 instruments, or one for every seventh person in the city.

Spokane, Wash.—That the progress of the Home Telephone Company's construction work in Spokane is being carried on in accordance with the conditions of their franchise is the substance of a report to the council, filed by the board of public works, and headed by W. W. Witherspoon. Appended is a letter from W. W. Hindman, secretary of the telephone company, in which he says that the company has purchased property for the erection of a sub-exchange in Augusta Avenue.

The investigation was in compliance with a resolution introduced in the council some time ago by Councilman Leonard Funk to determine if the company was living up to the terms of its franchise calling for the progress of its construction. The report follows:

"Having investigated the work being done by the Home Telephone Company under their franchise, will say that their exchange building is practically completed, and they are at present laying conduits on North Monroe Street."

Secretary Hindman says in his communication that the financial condition prevailing at one time held up the expedition of the work, but that at no time was consideration given to the abandonment of the project by the company. He adds:

"We have every reason to believe that in a short time the work will be pushed to an early completion. The company is acting in good faith and intends to carry out the terms of the franchise. A sub-exchange is to be established on property purchased on Augusta Avenue. The automatic equipment is now manufactured and ready for shipment."

ILLUMINATION.

El Paso, Texas.—The El Paso Military Institute is preparing to install its own electric lighting plant.

Dayton, N. M.—The Dayton Gas & Oil Company has struck a gas well one and one-half miles from this place.

Mill Valley, Cal.—The Marin County Gas Company, recently organized, will erect a plant at Pine Station at once.

Pasadena, Cal.—The City Council will on October 13th open bids for 5,000 pounds of copper wire for the use of the municipality.

San Diego, Cal.—The City Council has asked the City Engineer to prepare plans and specifications for ornamental street lamps on Sixth Street.

Phoenix, Ariz.—At a special election on September 26 the proposition to grant a franchise for a gas plant and distributing system to the South Side Gas Company was defeated.

San Bernardino, Cal.—The Board of Supervisors has sold to the Home Gas & Electric Company, of Redlands, a franchise covering many miles of county roads in the eastern section of the valley for $330.

Las Vegas, N. M.—The Consolidated Power and Telephone Company is installing street lights on Fremont Street and will probably extend the system to include all the business streets of the city.

San Bernardino, Cal.—The San Bernardino Gas & Electric Company is to lay a main from this city to Rialto Colony, a distance of about five miles, at which place a high-pressure gas service will be established.

Bakersfield, Cal.—A petition has been filed asking that a franchise be granted Edwin Anderson, doing business under the name of the Delano Electric Company, for an electric lighting system in the town of Delano.

Redwood City, Cal.—The City Council has made a formal demand on the United Gas & Electric Company to restore the municipal plant to the condition it was in at the time the company's contract with the city went into effect.

Newport, Cal.—Walter Cramp and others of this place have broken ground on their new gas plant for this place. The work is being superintended by Horace Slater and R. J. Dunnwill. A bonus of $5,000 was raised by subscription.

Safford, Ariz.—M. E. Webster, formerly local manager for the Consolidated Telephone, Telegraph and Electric Company, is in Safford working up a proposition to establish an electric lighting and power system for Safford and Thatcher.

San Francisco.—The Board of Supervisors have again taken up consideration of the Sullivan ordinance for the regulation of street railways and an attempt will be made to pass this. The ordinance is very stringent and will be fought by the United Railroads.

Sierra Madre, Cal.—The Board of Trade of this place is investigating the question of how to secure a gas supply for lighting the town. One plan calls for the erection of a plant by a local stock company, and another involves the piping of gas from Pasadena or Monrovia.

Long Beach, Cal.—President R. R. Christie, of the Long Beach Asbestos Company, reports that about 4,000 feet of natural gas is now running to waste daily from the company's wells and that his company will utilize the gas for the development of electricity for lighting a portion of the city.

Oakland, Cal.—A verdict awarding damages to the amount of $9,000 to Marshal Davoust from the city of Alameda, on account of the death of the wife of Mr. Davoust, which resulted from coming in contact with a fallen wire in Alameda ten years ago, has been found by a jury in the superior court of this city.

Redlands, Cal.—The Colton City Council will abrogate the contract made with the Redlands Home Gas & Electric Company to furnish electricity to the Colton municipality at two cents per kilowatt hour and will ask for bids for a new contract, the Edison Electric Company having promised a cheaper service. The matter will be taken into the courts.

OIL.

Los Angeles, Cal.—The City Council is advertising for sale a franchise for an oil pipe line on San Fernando Street.

Merida, Mexico.—It is reported that an oil pipe line is to be laid from Progreso to this place.

Reno, Nev.—The Washoe Oil & Development Company has resumed work on its well three miles west of Reno after a short shut down. The superintendent says that indications continue favorable and that he hopes to strike oil within the next hundred feet.

Los Angeles, Cal.—The Los Angeles Gas & Electric Company has begun suit against the Amalgamated Oil Company for alleged breach of contract in not furnishing oil as per a contract made in 1905. Altogether 16 suits will be begun, claiming a total of about $100,000 damages.

Salinas, Cal.—Notwithstanding some reverses in the supposed oil fields in this county, the Standard Oil Company is at work on six wells covering about twenty miles of territory. The Standard Oil Company is also negotiating for the lease of the Sargent Ranch at Bradley for a term of five years.

San Francisco.—The counties that contributed to California's total of 40,311,171 barrels of petroleum last year were as follows: Fresno, 9,050,300 barrels; Kern, 15,700,308; Los Angeles, 4,318,739; Orange, 2,426,750; Santa Clara, 22,100; San Luis Obispo, 48,127; Santa Barbara, 8,392,623; and Ventura, 352,224.

Bakersfield, Cal.—A contract made in February, 1907, by which the Maricopa Oil Co. and the Maricopa Road Oil & Development Company agreed to deliver 120,000 barrels of oil not less than 12 gravity to the Associated Oil Company, 60,000 barrels being delivered in 1907 and the remainder in 1908, has just been filed in this city.

Bakersfield, Cal.—The Vesta Oil Company has brought suit against the Sterling Oil & Development Company, the Independent Oil Producers' Agency, the Federated Oil Company, A. H. Liscomb, and Elmer E. Jones for quiet title to certain property and for an accounting as well as for the appointing of a reeciver to act during the pendency of the suit.

Los Angeles, Cal.—The Title Insurance & Trust Company of this city is advertising for sale certain real and personal property of the Union Consolidated Refining Company named in a deed of trust to secure payment of certain notes and obligations which have not been met by the Union Consolidated Refining Company. The property will be sold on November 10th.

Coalinga, Cal.—At special meeting here of the representatives of the Oil Producers' Agency, the contract between the Associated Oil Company and the Independent Oil Producers' Agency of Bakersfield and the Oil Producers' Agency of Coalinga was ratified. Five new companies were taken into the agency, as follows: Call Oil Company, Claremont Oil Company, Pilot Oil Company, Circle Oil Company, and Seneca Oil Company.

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